

Amendments to the Claims

The following is a complete listing of the claims that replaces all previous versions:

1. (Previously presented) A method of producing metal fibers, comprising:

 melting a mixture of at least a fiber metal and a matrix metal;

 cooling the mixture to form a bulk matrix comprising at least a fiber phase and a matrix phase; and

 removing at least a substantial portion of the matrix phase from the fiber phase,

 wherein at least one of a morphology, a size, and an aspect ratio of fiber in the fiber phase is modified by adjusting at least one process parameter.
2. (Original) The method of claim 1, further comprising:

 deforming the bulk matrix.
3. (Original) The method of claim 1, wherein the fiber phase comprises one of a metal and a metal alloy.
4. (Original) The method of claim 1, wherein the fiber metal is at least one of niobium, a niobium alloy, tantalum and a tantalum alloy.
5. (Original) The method of claim 1, wherein matrix metal is at least one of copper and a copper alloy.
6. (Original) The method of claim 1, wherein melting the mixture comprises at least one of vacuum arc remelting, induction melting, continuous casting, continuous casting strip over cooled counter-rotating rolls, squeeze-type casting, and rotating electrode powder melting.

7. (Original) The method of claim 1, wherein the fiber phase is in the form of dendrites in the matrix phase.
8. (Original) The method of claim 1, wherein the mixture is a eutectic mixture.
9. (Original) The method of claim 1, wherein the weight percentage of the fiber metal in the mixture is greater than 0 wt% and less than 70 wt%.
10. (Previously presented) The method of claim 1, wherein the weight percentage of the fiber metal in the mixture is from 15 wt % to 25 wt %.
11. (Original) The method of claim 2, wherein deforming the bulk matrix includes at least one of hot rolling, cold rolling, extruding, forging, drawing, and other mechanical processing methods.
12. (Previously presented) The method of claim 11, wherein the deforming the bulk matrix results in at least one of elongating the bulk matrix and reducing a cross-sectional area of the bulk matrix.
13. (Original) The method of claim 11, wherein the bulk matrix comprises at least one of fibers and dendrites of the fiber phase in a matrix of the matrix phase, and deforming the bulk matrix alters at least one of a size, shape, and form of the fiber phase.
14. (Original) The method of claim 1, wherein removing a substantial portion of the matrix phase from the fiber phase comprises at least one of dissolving the matrix phase and electrolysis of the matrix phase.
15. (Original) The method of claim 14, wherein dissolving the matrix phase comprises dissolving the matrix phase in a suitable mineral acid.
16. (Original) The method of claim 15, wherein the mineral acid is at least one of nitric acid, sulfuric acid, hydrochloric acid and phosphoric acid.

17. (Original) The method of claim 1, wherein after removing at least a substantial portion of the matrix phase, the fiber phase is in the form of a dendrite.

18. (Original) The method of claim 17, wherein the fiber phase is in the form of at least one of a fiber, needle, ribbon, and a rounded shape.

19. (Previously presented) A method of producing metal fibers, comprising:

melting a mixture of at least niobium and copper;

cooling the mixture to form a bulk matrix comprising at least a fiber phase comprising a significant portion of the niobium and a matrix phase comprising a significant portion of the copper; and

removing at least a substantial portion of the matrix phase from the fiber phase.

wherein at least one of a morphology, a size, and an aspect ratio of fiber in the fiber phase is modified by adjusting at least one process parameter.

20. (Original) The method of claim 19, further comprising:

deforming the bulk matrix.

21. (Canceled)

22. (Original) The method of claim 19, wherein melting the mixture comprises at least one of vacuum arc remelting, induction melting, continuous casting, continuous casting strip over cooled counter-rotating rolls, squeeze-type casting, and rotating electrode powder melting.

23. (Original) The method of claim 19, wherein the fiber phase is in the form of dendrites in the matrix phase.

24. (Original) The method of claim 19, wherein the weight percentage of the fiber metal in the mixture is from 15 wt.% to 25 wt.%.
25. (Original) The method of claim 20, wherein deforming the bulk matrix includes at least one of hot rolling, cold rolling, extruding, forging, drawing, and other mechanical processing methods.
26. (Previously presented) The method of claim 20, wherein deforming the bulk matrix comprises cold rolling the bulk matrix.
27. (Original) The method of claim 19, wherein removing a substantial portion of the matrix phase from the fiber phase comprises at least one of dissolving the matrix phase and electrolytes.
28. (Original) The method of claim 27, wherein dissolving the matrix metal comprises dissolving the matrix metal in a suitable mineral acid.
29. (Original) The method of claim 28, wherein the mineral acid is at least one of nitric acid, sulfuric acid, hydrochloric acid and phosphoric acid.
30. (Original) The method of claim 19, wherein after removing at least a substantial portion of the matrix phase, the fiber phase is in the form of a dendrite.
31. (Original) The method of claim 30, wherein the fiber phase is in the form of at least one of a fiber, needle, ribbon, and a rounded shape.
32. (Previously presented) The method of claim 1, wherein the weight percentage of the fiber metal in the mixture is from greater than 0 wt % to 50 wt %
33. (Previously presented) The method of claim 1, wherein the weight percentage of the fiber metal in the mixture is from 5 wt % to 50 wt %.

34. (Previously presented) The method of claim 1, wherein the weight percentage of the fiber metal in the mixture is from 15 wt % to 50 wt %.
35. (Previously presented) The method of claim 1, wherein the weight percentage of the fiber metal in the mixture is from greater than 0 wt % to 35 wt %
36. (Previously presented) The method of claim 1, wherein the fiber phase has an oxygen content of 1.5 wt % or less.
37. (Previously presented) The method of claim 1, wherein the fiber metal has a form prior to melting of at least one of rods, plate machine chips, machine turnings, fine input stock and coarse input stock.
38. (Previously presented) The method of claim 7, wherein the dendrites are in the form of tree-like branching dendrites.
39. (Previously presented) The method of claim 7, wherein the dendrites have a surface area of at least 2.0 m²/g.
40. (Previously presented) The method of claim 19, wherein the weight percentage of the fiber metal in the mixture is from greater than 0 wt % to 50 wt %.
41. (Previously presented) The method of claim 19, wherein the weight percentage of the fiber metal in the mixture is from 5 wt % to 50 wt %.
42. (Previously presented) The method of claim 19, wherein the weight percentage of the fiber metal in the mixture is from 15 wt % to 50 wt %.
43. (Previously presented) The method of claim 19, wherein the weight percentage of the fiber metal in the mixture is from greater than 0 wt % to 35 wt %.
44. (Previously presented) The method of claim 19, wherein the fiber phase has an oxygen content of 1.5 wt % or less.

45. (Previously presented) The method of claim 19, wherein the fiber metal has a form prior to melting of at least one of rods, plate machine chips, machine turnings, fine input stock and coarse input stock.

46. (Previously presented) The method of claim 19, wherein the fiber phase comprises an alloy comprising niobium, 10 wt% hafnium, 0.7 to 1.3 wt % titanium, 0.7 wt % zirconium, and 0.5 wt % tungsten.

47. (Previously presented) The method of claim 23, wherein the dendrites are in the form of tree-like branching dendrites.

48. (Previously presented) The method of claim 23, wherein the dendrites have a surface area of at least 2.0 m²/g.

49. (Previously presented) The method of claim 1, wherein adjusting at least one process parameter comprises adjusting at least one of a ratio of metals in the melt, a melting rate, a solidification rate, a solidification geometry, a melting method, a solidification method, a molten pool volume, and an addition of other alloying elements.

50. (Previously presented) The method of claim 1, further comprising:

processing the fiber phase after removing at least a substantial portion of the matrix phase, wherein processing the fiber phase comprises at least one of sintering the fiber phase, pressing the fiber phase, washing the fiber phase, rendering the fiber phase into a powder-like consistency, and shortening the fibers of the fiber phase.

51. (Previously presented) The method of claim 50, wherein processing the fiber phase comprises rendering the fiber phase into a powder-like consistency by high-speed shearing of the fiber phase in a viscous fluid, hydride dehydride and crushing process.

52. (Previously presented) The method of claim 50, wherein processing the fiber phase comprises shortening the fibers of the fiber phase by freezing a slurry of the fiber phase into a plurality of small ice pellets and processing the plurality of small ice pellets in a blender.

53. (Previously presented) The method of claim 19, wherein adjusting at least one process parameter comprises adjusting at least one of a ratio of metals in the melt, a melting rate, a solidification rate, a solidification geometry, a melting method, a solidification method, a molten pool volume, and an addition of other alloying elements.

54. (Previously presented) The method of claim 19, further comprising:

processing the fiber phase after removing at least a substantial portion of the matrix phase, wherein processing the fiber phase comprises at least one of sintering the fiber phase, pressing the fiber phase, washing the fiber phase, rendering the fiber phase into a powder-like consistency, and shortening the fibers of the fiber phase.

55. (Previously presented) The method of claim 54, wherein processing the fiber phase comprises rendering the fiber phase into a powder-like consistency by high-speed shearing of the fiber phase in a viscous fluid; hydride dehydride and crushing process.

56. (Previously presented) The method of claim 54, wherein processing the fiber phase comprises shortening the fibers of the fiber phase by freezing a slurry of the fiber phase into a plurality of small ice pellets and processing the plurality of small ice pellets in a blender.

57. (Previously presented) A method of producing metal fibers, comprising:

melting a mixture of at least a fiber metal and a matrix metal;

cooling the mixture to form a bulk matrix comprising at least a fiber phase and a matrix phase;

removing at least a substantial portion of the matrix phase from the fiber phase; and

processing the fiber phase, wherein processing the fiber phase comprises at least one of sintering the fiber phase, pressing the fiber phase, washing the fiber phase, rendering the fiber phase into a powder-like consistency, and shortening the fibers of fiber phase.

58. (Previously presented) The method of claim 57, wherein processing the fiber phase comprises rendering the fiber phase into a powder-like consistency by high-speed shearing of the fiber phase in a viscous fluid, hydride dehydride and crushing process.

59. (Previously presented) The method of claim 57, wherein processing the fiber phase comprises shortening the fibers of the fiber phase by freezing a slurry of the fiber phase into a plurality of small ice pellets and processing the plurality of small ice pellets in a blender.

60. (Previously presented) The method of claim 57, further comprising:
deforming the bulk matrix.

61. (Previously presented) A method of producing metal fibers, comprising:
melting a mixture of at least niobium and copper;
cooling the mixture to form a bulk matrix comprising at least a fiber phase comprising a significant portion of the niobium and a matrix phase comprising a significant portion of the copper;

removing at least a substantial portion of the matrix phase from the fiber phase; and

processing the fiber phase, wherein processing the fiber phase comprises at least one of sintering the fiber phase, pressing the fiber phase, washing the fiber phase, rendering the fiber phase into a powder-like consistency, and shortening the fibers of the fiber phase.

62. (Previously presented) The method of claim 61, wherein processing the fiber phase comprises rendering the fiber phase into a powder-like consistency by high-speed shearing of the fiber phase in a viscous fluid, hydride dehydride and crushing process.

63. (Previously presented) The method of claim 61, wherein processing the fiber phase comprises shortening the fibers of the fiber phase by freezing a slurry of the fiber phase into a plurality of small ice pellets and processing the plurality of small ice pellets in a blender.

64. (Previously presented) The method of claim 61, further comprising:
deforming the bulk matrix.